



# Absorption, dissociation, locus of control and presence in virtual reality

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## Abstract

The present study aimed to explore the relationship between a number of psychological variables and a reported sense of presence in immersive virtual reality (IVR). It was hypothesised that participants' scores on measures of absorption, dissociation, and external locus of control would be positively and significantly correlated with a measure of their sense of presence in IVR. A total of 64 people took part. Significant correlations were found between presence and dissociation ( $r = 0.403$ ,  $p < 0.01$ ), and presence and locus of control ( $r = 0.268$ ,  $p < 0.05$ ). However, the correlation between presence and absorption was not significant ( $r = -0.037$ ,  $p = 0.386$ ). The findings reported here suggest a complex interrelationship of psychological variables in relation to presence in IVR that warrants further research.  
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## 1. Introduction

One of the aims of immersive virtual reality (IVR) research is to identify under what circumstances a person may feel 'present' within a virtual environment (VE). Frequently presence questionnaires have been used in such research to identify the

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features of VEs, as well as the psychological characteristics of VR experients, that are associated with higher degrees of reported presence. Features of an IVR system that have been found to influence higher reported levels of presence in a VE include the user having a virtual body (Slater & Usoh, 1994a), the inclusion of dynamic shadows within the VE (Slater, Usoh, & Crysanthou, 1995), and natural navigation techniques such as ‘walking’ (Slater, Usoh, & Steed, 1995). Similarly, the degree to which a person has a dominant mode of auditory, visual or kinaesthetic mode of encoding information has been found to be related to their sense of presence in a VE (Slater & Usoh, 1994b).

The present study is concerned with the psychological variables of absorption (Tellegen & Atkinson, 1974), dissociation (Bernstein & Putnam, 1986), and locus of control (Rotter, 1966) in relation to a person’s experience of presence within a VE. These variables have been little explored, although we will argue there are strong reasons for doing so. In addition, we have reservations about the small literature that does exist on this particular topic. We will begin by critiquing this research before presenting our research study.

Glicksohn and Avnon (1997) examined the relationship between levels of absorption and the experience of altered states of consciousness (ASC) accompanying virtual reality use. They noted a variety of factors to which absorption has been studied, including imagination, imaginative involvement, and experiential involvement, and argued that individual differences in levels of absorption would lead to differing levels of experience and interaction in IVR. Participants within their study were classified as having had an ASC if during introspective reports obtained during their IVR use the participant *either* used terms indicative of this (e.g. ‘floating’, ‘drifting’, ‘dreamy’) or reported changes on at least two dimensions of thought, somatic perception, emotion, or control over cognitive functioning. Despite having a small sample ( $n = 12$ ) Glicksohn and Avnon found that those subjects classified as having experienced an ASC ( $n = 8$ ) had higher absorption scores than those who did not ( $n = 4$ ), arguing that absorption level is a predisposing factor in ASCs.

The criteria for the occurrence of an ASC in the above study can be criticised for its potential to result in a number of similarly classed individuals (having had an ASC) who might not share in common any of the categorising criteria. However, it is informative of a role of absorption in experiencing an IVR. As such it is suggestive of a role for absorption in a person’s sense of presence within virtual reality.

To a certain extent absorption and presence have been studied indirectly in so much as presence has often been equated with the ability to become involved, immersed or absorbed in certain activities or media. Witmer and Singer’s (1998) immersive tendencies questionnaire (ITQ) for instance was developed to identify those persons who would be more likely to experience a sense of presence in IVR. Yet a number of items on the ITQ are similar to measures of absorption, such as the Tellegen absorption scale (TAS). For instance, we can compare the following items taken from the ITQ and TAS: ‘Do you ever become so involved in a movie that you are not aware of things happening around you?’ (ITQ), ‘While watching a movie, a TV show, or a play, I may become so involved that I may forget about myself and my surroundings and experience the story as if it were real and as if I were taking part in

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